Listing of the Claims:

Note: No claims have been amended, and the following listing of claims is provided for reference only.

1 (original): An apparatus for transmitting and receiving multiplexed audio and data information, the apparatus being adapted to a wireless audio system for receiving a plurality of input signals of various types, the plurality of input signals at least comprising an analog audio signal, a first digital audio signal, and a control signal, the apparatus comprising:

an analog-to-digital converter for transforming the analog audio signal into a second digital audio signal;

a signal-selecting device electrically connected to the analog-to-digital converter for selecting either the first digital audio signal or the second digital audio signal for outputting;

a digital-signal-format transformer electrically connected to the signal-selecting device for transforming the first digital audio signal or the second digital audio signal into a pulse audio signal; and

a synthesizing module electrically connected to the digital-signal-format transformer for merging the control signal and the pulse audio signal into a digital signal of bit-stream form.

2 (original): The apparatus of claim 1, wherein the pulse audio signal conforms to a pulse-code modulation (PCM) specification.

3 (original): The apparatus of claim 1, wherein the signal-selecting device is a multiplexer for selecting either the first digital audio signal or the second digital audio signal for outputting.

4 (original): The apparatus of claim 1, wherein the wireless audio system further comprises a modulation module electrically connected to the synthesizing module for modulating the digital signal of bit-stream form to

generate a corresponding baseband signal.

5 (original): The apparatus of claim 4, wherein the modulation module comprises:

a modulation circuit electrically connected to the synthesizing module for modulating the digital signal of bit-stream form to generate a modulated signal; and

a spreading circuit electrically connected to the modulation circuit for proceeding operations between the modulated signal and a spreading code to generate the baseband signal.

6 (original): The apparatus of claim 4, wherein the wireless audio system further comprises a transmitting circuit electrically connected to the modulation module for transforming the baseband signal into a RF signal and for transmitting the RF signal to a free space.

7 (original): The apparatus of claim 6, wherein the wireless audio system further comprises a receiver comprising:

a receiving circuit for receiving the RF signal and for generating a corresponding baseband signal;

a demodulation module electrically connected to the receiving circuit for demodulating the baseband signal into a digital signal of bit-stream form;

a separating module electrically connected to the demodulation module for separating the digital signal of bit-stream form into a control signal and a pulse audio signal;

a digital-signal-format transformer electrically connected to the separating module for transforming the pulse audio signal into a digital audio signal;

a signal-judging device electrically connected to the digital-signal-format

transformer for classifying the digital audio signal into either a first digital audio signal or a second digital audio signal; and

a digital-to-analog converter electrically connected to the signal-judging device for transforming the second digital audio signal into an analog audio signal.

8 (original): The apparatus of claim 7, wherein signal-judging device is a de-multiplexer for classifying the digital audio signal into either the first digital audio signal or the second digital audio signal.

9 (original): The apparatus of claim 7, wherein the demodulation module comprises a de-spreading circuit and a demodulation circuit, wherein the de-spreading circuit executes a convolution/multiplication operation between the baseband signal and a spreading code to transform the baseband signal into a de-spreading signal, and the demodulation circuit then demodulates the de-spreading signal to generate the digital signal of bit-stream form.

10 (original): An apparatus for transmitting and receiving multiplexed audio and data information in a wireless audio system for receiving a digital signal of bit-stream form, the apparatus comprising:

a separating module for separating the digital signal of bit-stream form into a control signal and a pulse audio signal;

a digital-signal-format transformer electrically connected to the separating module for transforming the pulse audio signal into a digital audio signal;

a signal-judging device electrically connected to the digital-signal-format transformer for classifying the digital audio signal into either a first digital audio signal or a second digital audio signal; and

a digital-to-analog converter electrically connected to the signal-judging

device for transforming the second digital audio signal into an analog audio signal.

11 (original): The apparatus of claim 10, wherein the signal-judging device is a de-multiplexer for classifying the digital audio signal into either the first digital audio signal or the second digital audio signal.

12 (original): The apparatus of claim 10, wherein the wireless audio system further comprises a receiving circuit and a demodulation module, wherein the receiving circuit is used for receiving a RF signal to generate a corresponding baseband signal, and the demodulation module is electrically connected to the receiving circuit for demodulating the baseband signal into the digital signal of bit-stream form.

13 (original): The apparatus of claim 12, wherein the demodulation module comprises a de-spreading circuit and a demodulation circuit, wherein the de-spreading circuit executes a convolution/multiplication operation between the baseband signal and a spreading code to transform the baseband signal into a de-spreading signal, and the demodulation circuit then demodulates the de-spreading signal to generate the digital signal of bit-stream form.

14 (original): The apparatus of claim 10, wherein the pulse audio signal conforms to a pulse-code modulation (PCM) specification.

15 (original): The apparatus of claim 10, wherein the wireless audio system further comprises a transmitter for receiving a plurality of input signals of various types, the plurality of input signals at least comprising an analog audio signal, a first digital audio signal, and a control signal, the transmitter comprising:

an analog-to-digital converter for transforming the analog audio signal

into the second digital audio signal;

a signal-selecting device electrically connected to the analog-to-digital converter for selecting either the first digital audio signal or the second digital audio signal for outputting;

a digital-signal-format transformer electrically connected to the signal-selecting device for transforming the first digital audio signal or the second digital audio signal into a pulse audio signal;

a synthesizing module electrically connected to the digital-signal-format transformer for merging the control signal and the pulse audio signal into a digital signal of bit-stream form;

a modulation module electrically connected to the synthesizing module for modulating the digital signal of bit-stream form so as to generate a corresponding baseband signal; and

a transmitting circuit electrically connected to the modulation module for transforming the baseband signal into a RF signal and for transmitting the RF signal to a free space.

16 (original): The apparatus of claim 15, wherein the signal-selecting device is a multiplexer for selecting either the first digital audio signal or the second digital audio signal for outputting.

17 (original): The apparatus of claim 15, wherein the modulation module comprises:

a modulation circuit electrically connected to the synthesizing module for modulating the digital signal of bit-stream form to generate a modulated signal; and

a spreading circuit electrically connected to the modulation circuit for proceeding operations between the modulated signal and a spreading code to generate the baseband signal.

18 (original): A wireless audio system for transmitting and receiving multiplexed audio and data information comprising:

a transmitter for receiving a plurality of input signals of various types, the plurality of input signals at least comprising a first digital audio input signal, and a control input signal, the transmitter comprising:

a selecting-synthesizing device for transforming the first digital audio input signal into a transformed digital audio signal and then for merging the transformed digital audio signal with the control input signal to generate a digital input signal of bit-stream form;

a modulation module electrically connected to the selecting-synthesizing device for modulating the digital input signal of bit-stream form to generate a corresponding baseband signal; and

a transmitting circuit electrically connected to the modulation module for transforming the baseband signal into a RF signal and for transmitting the RF signal to a free space; and

a receiver for receiving the RF signal to output a plurality of output signals of various types, the receiver comprising:

a receiving circuit for receiving the RF signal so as to generate a corresponding baseband signal;

a demodulation module electrically connected to the receiving circuit for demodulating the baseband signal into a digital output signal of bit-stream form;

a separating-classifying device for separating the digital output signal of bit-stream form into a control output signal and a first digital audio output signal;

wherein the first digital audio output signal and the control output signal respectively correspond to the first digital audio input signal and the control input signal.

19 (original): The wireless audio system of claim 18, wherein the modulation module comprises:

a modulation circuit being a $\pi/4$ –DQPSK modulation circuit for modulating the digital signal of bit-stream form to generate a modulated signal; and

a spreading circuit electrically connected to the modulation circuit for executing operations between the modulated signal and a spreading code to generate the baseband signal.

20 (original): The wireless audio system of claim 18, wherein the plurality of input signals further comprise an analog audio input signal.

21 (original): The wireless audio system of claim 20, wherein the transmitter further comprises an analog-to-digital converter for transforming the analog audio input signal into a corresponding second digital audio input signal, and the selecting-synthesizing device selects either the first digital audio input signal or the second digital audio input signal for a signal-format transforming process.

22 (original): The wireless audio system of claim 21, wherein the separating-classifying device of the receiver is used to determine that the digital audio output signal is either a first digital audio output signal or a second digital audio output signal.

23 (original): The wireless audio system of claim 22, wherein the receiver further comprises a digital-to-analog converter electrically connected to the separating-classifying device for transforming the second digital audio output signal into a corresponding analog audio output signal.

24 (original): The wireless audio system of claim 23, wherein the analog audio output signal and the second digital audio output signal respectively

correspond to the analog audio input signal and the second digital audio input signal.

25 (original): The wireless audio system of claim 24, wherein the selecting-synthesizing device comprises:

a signal-selecting device electrically connected to the analog-to-digital converter for selecting either the first digital audio input signal or the second digital audio input signal for outputting;

a digital-signal-format transformer electrically connected to the signal-selecting device for transforming the first digital audio input signal or the second digital audio input signal into a pulse audio signal; and

a synthesizing module electrically connected to the digital-signal-format transformer for merging the control input signal and the pulse audio signal into the digital input signal of bit-stream form.

26 (original): The wireless audio system of claim 18, wherein the pulse audio signal conforms to a pulse-code modulation (PCM) specification.

27 (original): The wireless audio system of claim 24, wherein the separating-classifying device comprises:

a separating module for separating the digital output signal of bit-stream form into the control output signal and the pulse audio signal;

a digital-signal-format transformer electrically connected to the separating module for transforming the pulse audio signal into the digital audio output signal; and

a signal-judging device electrically connected to the digital-signal-format transformer for determining the digital audio output signal into either the first digital audio output signal or the second digital audio output signal.

28 (original): The wireless audio system of claim 18, wherein the pulse audio signal conforms to a pulse-code modulation (PCM) specification.

29 (original): The wireless audio system of claim 18, wherein the demodulation module comprises a de-spreading circuit and a demodulation circuit, wherein the de-spreading circuit executes a convolution/multiplication operation between the baseband signal and a spreading code to transform the baseband signal into a de-spreading signal, and then the demodulation circuit applies a $\pi/4$ –DQPSK demodulating operation toward the de-spreading signal to generate the digital signal of bit-stream form.